Case Report

Endovascular Therapy for a Patient With Chronic Mesenteric Ischemia

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Percutaneous transluminal angioplasty is now used widely in the revascularization of peripheral artery disease. We report the case of a 75-year-old woman with chronic mesenteric ischemia, who presented with postprandial abdominal pain, food fear, and weight loss for 6 months. Mesenteric angiography showed critical stenosis in the celiac trunk, and superior and inferior mesenteric arteries. Instead of surgical revascularization, balloon angioplasty and stenting was performed on the celiac trunk and superior mesenteric artery. The patient had improved appetite and weight gain after the procedure. This case report demonstrates the clinical benefit of multiple vessel intervention with stenting in the treatment of chronic mesenteric ischemia.

Key Words: angioplasty, atherosclerosis, chronic mesenteric ischemia, elderly, stenting

Chronic mesenteric ischemia (CMI) is a rare but catastrophic disease. Patients with this disease are usually elderly and have multiple chronic diseases. The symptoms of CMI include postprandial abdominal pain, food fear, weight loss, nausea and vomiting. If the mesenteric ischemia is not relieved, the patient develops cachexia and acute bowel ischemia, and death ensues.¹ The treatment of symptomatic CMI has traditionally involved surgical procedures, which are associated with a high technical success rate of up to 95%.² Endovascular therapy, including percutaneous transluminal angioplasty (PTA) and stenting, is now the alternative choice for mesenteric revascularization.

Endovascular therapy has been reported to have a lower peri-procedural complication rate and a similar immediate technical success rate compared with surgery. Here, we present a case of typical CMI, whose symptoms were relieved completely after PTA and stenting.

Case Report

A 75-year-old woman was admitted to the National Taiwan University Hospital because of epigastralgia and weight loss for 6 months. Her past history was remarkable, with diabetes mellitus...
and hypertension controlled with oral medication. In addition, she had coronary artery disease and had received coronary intervention four times. The patient complained of intermittent abdominal pain, especially at 10–15 minutes after meals. The symptoms progressed and she became afraid of eating. She lost 6 kg in weight within 6 months (from 60 to 54 kg). Laboratory examinations (including liver function profiles) were within normal ranges. The abdominal sonography and endoscopy did not show abnormalities. Under suspicion of mesenteric ischemia, magnetic resonance angiography was performed and critical stenosis in the celiac trunk and inferior mesenteric artery (IMA) was disclosed. She was then admitted for mesenteric revascularization.

Angiography was performed via the right femoral artery. Selective mesenteric angiography showed 90% stenosis in the proximal portion of the celiac trunk and 90% stenosis at the orifice of the IMA (Figures 1 and 2). The distal branches of the celiac trunk could not be well opacified because of critical stenosis. The superior mesenteric artery (SMA) could not be well studied as a result of failed selective cannulation. In addition, renal arteriography demonstrated irregular 80% stenosis in the proximal portion of the right renal artery and 50% stenosis in the left renal artery. Revascularization of the right renal artery and celiac trunk was planned.

The right renal artery was cannulated with a Renal double curve (Cordis/Johnson and Johnson, Miami, FL, USA) 8F guiding catheter via the right femoral artery. Direct stenting was performed with a 6.0 × 18 mm Genesis stent (Cordis), with good results. The same guiding catheter was used to engage the celiac trunk, again with success, and a 0.014 coronary wire was used to pass the lesion. We dilated the celiac ostial lesion with a 4.0 × 20 mm coronary balloon and a suboptimal result was noted after the dilatation. A 4.0 × 16 mm Liberté coronary stent (Boston Scientific Natick, MA, USA) was deployed smoothly, which resulted in around 20% residual stenosis (Figure 3). The post-procedural course was smooth. After discharge, however, the postprandial abdominal pain returned.
pain only improved slightly. Further intervention was planned 2 months after the first procedure. Selective angiography of the mesenteric arteries was performed again with a JR diagnostic catheter (Medtronic, Minneapolis, MN, USA) through the right femoral approach. There was 30% in-stent restenosis in the celiac trunk, and 90% stenosis in the ostium of the IMA. The SMA was opacified successfully, and subocclusion was demonstrated just distal to the middle colic artery (Figure 4). We decided to use PTA on both the SMA and IMA. A 7F PK1 guiding catheter (Metronic; 47 cm long) was used to engage the SMA, and a 0.014 Rinato guide wire (Asahi Intec, Aichi, Japan) was used to pass the lesion. The lesion was pre-dilated with a 2.5 × 15 mm Maverick balloon and a 4.0 × 12 mm Quantum balloon (Boston Scientific Natick, MA, USA). A 6.0 × 18 mm Genesis stent (Cordis) was deployed to the mid-portion of the SMA, with good results (Figure 5). We used the same PK1 guiding catheter and Rinato wire for IMA intervention. The ostial lesion was dilated with a 3.0 × 15 mm Sprinter coronary balloon (Medtronic), 4.0 × 12 mm Quantum balloon, and a 3.5 × 10 mm cutting balloon, but the balloons could not be fully dilated. The final result showed around 70% residual stenosis, with satisfactory distal blood flow (Figure 6).

After the second intervention, the symptoms improved dramatically. The patient gained 3 kg in 2 months. The abdominal discomfort did not recur for 4 months after the angioplasty.

**Discussion**

Atherosclerosis of the mesenteric arteries is not rare in elderly. In an autopsy study of unselected patients, splanchnic atherosclerosis was reported in 35–70% patients.\(^3\) However, the incidence of
CMI is low in clinical practice. Patients with mesenteric artery disease may be symptom free until the blood supply cannot meet the postprandial demand. There are three visceral vessels that supply the bowel: the celiac trunk, SMA, and IMA. Between these, there are abundant collateral vessels. Clinical symptoms usually are caused by stenosis or occlusion of multiple mesenteric arteries. The symptoms of CMI are nonspecific and the physical findings are not remarkable, therefore, the diagnosis is difficult and a high degree of clinical suspicion is needed. In addition, CMI is a progressive disease. Patients with significant three-vessel disease have been followed in a previous study, and 86% of the asymptomatic patients had incident intestinal ischemia. In some patients, acute intestinal ischemia and death eventually develop. Therefore, correct diagnosis and treatment of CMI are important. Diagnosis of CMI traditionally has been achieved by catheter angiography, but computed tomography angiography and magnetic resonance angiography are associated with high diagnostic sensitivity and specificity. Catheter angiography is now recommended when endovascular therapy is planned.

Open surgical revascularization is the traditional therapy for CMI. There are several different surgical approaches, which can be divided into two categories: endarterectomy and vascular bypass. The overall technical success rate is around 95%, and the 5-year survival rate is reported as 61–64%. The overall 5-year graft patency is around 78%. However, the perioperative complication rate is reported to be between 33% and 47%, and the 30-day mortality rate is around 10%. In patients with multiple underlying diseases, the operation carries high mortality and morbidity. Endovascular therapy is a less invasive technique and has become an attractive alternative option.

Endovascular revascularization has been used for different peripheral artery diseases, including those of the renal and iliac arteries. For mesenteric artery stenosis, the first successful angioplasty was reported in 1980 by Furrer et al. In several small series, endovascular therapy has been reported to have a technical success rate of 90%. Compared with surgical therapy, PTA has potential advantages such as shorter hospital stay, less invasiveness, a lower cost, and fewer major complications. Although mesenteric PTA is considered to be an effective and safe choice, comparative studies of surgery and PTA have been rare. In a retrospective study that compared endovascular and open revascularization, the immediate technical success rate was similar in the two groups (95.3% in the PTA and 100% in the surgical group). However, freedom from symptoms was greater in the open group (68% and 59% for 1 and 2 years in the open group, and 27% and 20% in the endovascular group). In conclusion, endovascular therapy was considered as a less durable treatment. There were two possible reasons that favored surgery. First, there were more vessels that were treated by surgery. Anatomically, the mesenteric arteries arise from the ventral surface of the abdominal aorta, at a sharp angle, and good catheter engagement with the arteries is not always possible. The anatomical difficulty with PTA could result in incomplete revascularization. Second, some patients received balloon angioplasty without stenting in mesenteric PTA. Peripheral stenting has proved effective in the revascularization of renal and iliac artery disease. Stent deployment can overcome acute closure and vascular recoil, and reduce the rate of late restenosis. Open and endovascular procedures for mesenteric revascularization might have different results in the stent era. In one study of mesenteric PTA with stenting, the procedural success was 96% and the symptom relief rate was 88%. After 5-year follow-up, the symptom-free and survival rates were 72% and 79%, respectively, which is comparable to previous surgical studies. In patients with multiple vessel intervention, there was less symptom recurrence. In our patient, we performed successful PTA and stenting of two vessels: the celiac artery and SMA. We expected a long-term benefit comparable with that of surgery. In conclusion, we describe a patient with CMI that was diagnosed with magnetic resonance angiography and treated with endovascular therapy. The symptoms of CMI improved partially after the
first intervention, and the discomfort was relieved completely after the secondary procedure. When endovascular therapy is performed in patients with CMI, we suggest multiple vessel intervention and stent deployment.

References